for heat control. The application includes two independent claims (1 and 26), and each independent claim requires a manganese containing perovskite represented by $A_{1-x}B_xMnO_3$ where A is La, Pr, Nd, or Sm, and B is Ca, Sr or Ba. Most importantly, the material behaves in the manner of an insulator at high temperature and a metal at low temperature. Thus, at high temperatures, the material radiates a large amount of heat, and at low temperatures, the material radiates a small amount of heat. As set forth in claim 1, the material has low emissivity at low temperature and high emissivity at high temperature (i.e., there is a positive temperature variance where conductivity decreases with elevating temperature).

Based on the record, the Examiner should conclude that substances having the recited attributes of the claimed invention are quite rare. Evidence of the same can be found in the declaration of Mr. Kubo filed June 22, 2001 at item 13. Furthermore, the Examiner has failed to identify any other reference describing this property and its potential use in passive heat control devices.

In view of this, it is clear that not many materials will have the desired properties; therefore, substituting one material for another would not yield predictable results. Moreover, as discussed in the amendment filed December 5, 2001, the differences in the reported properties of the same material set forth in the Benson, Neuman and Okamoto references with respect to the properties of vanadium oxide underscores the unpredictable nature of material and rare performance characteristics being claimed.

With this in mind, the Examiner cannot properly maintain a position that claims 1 and 26, or their dependent claims, would be obvious to one of ordinary skill in the art.

In each rejection, the Examiner has relied on Urushibura et al. As showing a material which fits the claimed stoichiometric formula $A_{1-x}B_xMnO_3$ (i.e., Urushibura describes physical characteristics of $La_{1-x}Sr_xMnO_3$). However, the applicants have not claimed a new material. They have claimed the use of a particular class of materials used for heating control and in heating control devices. Noticeably absent from Urushibura et al. is any teaching whatsoever with respect to positive temperature variance or its potential use in heat control applications. The Examiner's attention is drawn to Figure 2 of Urushibura in the

left column of 14 105. Here it is shown that, depending on the value of "x" the resistivity increases or decreases with increasing temperature. Of course, increasing resistance results in decreasing conductance. The Applicants have claimed a heating device which has a specific class of material in a formulation where the conductivity will decrease with increasing temperature.

In rejecting claims 1 and 4, the Examiner has relied on either Genshiro or Benson in combination with Urushiburo and Van Buskirk. However, Genshiro, Benson, and Van Buskirk, in combination with Urushiburo, would not make the claimed invention obvious to one of ordinary skill in the art.

Independent claim 1, as well as independent claim 26, requires a variable phase substance containing perovskite Mn oxide having the general formula $A_{1-x}B_xMnO_3$ which is used to control the temperature of an object. Substances having positive temperature variance at temperatures around room temperature are extremely rare. No combination of references would therefore make the claimed combination and methods obvious.

The patent application to Genshiro was laid-open for public inspection without a request for examination being filed. Genshiro uses a superconductor that performs metal-insulator transition at very low temperature. Thus, Genshiro is not applicable to an ordinary artificial satellite operating at temperatures around room temperature. By contrast, substance $La_xSr_{1-x}MnO_3$ applied to the present invention performs transition at temperatures around room temperature and is therefore suitable for a broad range of applications. Although the transition temperature of high-temperature superconductors has recently risen to around 100 K because of the progress of recent studies, high-temperature superconductors performing stable transition at room temperature have not been reported yet.

Van Buskirk does not make up for the deficiencies of Genshiro. In particular, Van Buskirk describes solar selective paints for coating on aluminum substrates. Van Buskirk does not describe a material with a positive temperature variance.

The Benson reference describes a doped vanadium oxide material. Its performance characteristics are disputed by Mr. Kubo's declaration of filed June 22, 2001 (see items 14 and 15). Nevertheless, the Examiner cannot ignore

Benson's direct teaching to the opposite of the claimed invention where he states in column 13, lines 22-23 that "Vanadium oxide changes from the emissive, electrically insulating state to the non-emissive, metallic state as a function of temperature". This is opposite to the claimed invention. Thus, the Examiner's suggestion that one could use different materials for the Benson vanadium oxide, and reasoning that the Urushibura material might be selected as one of those materials flies in the face of the fact that the claimed material properties are opposite those taught in Benson. Given the teaching of Benson, one of ordinary skill in the art would be motivated to select materials with the more common attribute of having insulative properties at low temperature and conductive properties at high temperature. Finally, as noted above, Van Buskirk does not make up for any of the deficiencies of Benson and Urushibara. Van Buskirk does not describe a material with a positive temperature variance. The Examiner's reference to Van Buskirk's teaching of a relationship between electrical conductance and optical properties is simply misplaced and has no bearing on the claimed invention.

Furthermore, as noted above, it should be concluded by the Examiner, the materials having the properties of the claimed invention are very rare. As such, combinations of Benson, Urushibara and Van Buskirk cannot be properly made, and, if made, would not result in the claimed invention.

With reference to claims 26 and 27, the Examiner has relied on the combination of Genshiro, Urushibara and Van Buskirk. However, as explained above, the Genshiro reference is not applicable to the claimed method in method claim 26. Hence substitution of materials as proposed by the Examiner would not be performed by one of ordinary skill in the art to defeat the intended purpose of Genshiro. Thus, one of ordinary skill in the art would not likely substitute the Urushibara materials for the Genshiro superconductive radiating board. Moreover, as can be seen by the data in Urushibara, selection of materials within the claimed class is required so as to achieve the claimed characteristics in the method. No reference, including Urushibara provides any direction to one of ordinary skill in the art with respect to selection of the materials for the claimed heat control application. Finally, Van Buskirk adds nothing to the combination.

Specifically, it does not describe a methodology whereby a variable phase substance would be used to control temperature, it does not describe a substance that has insulative properties at high temperature and conductive properties at low temperature, and it does not describe passive temperature control of satellite devices (it describes coatings for solar collectors). In view of this, claims 26 and 27 cannot properly be deemed to be obvious over a combination of Genshiro, Urushibara, and Van Buskirk.

Claims 5 and 6 have been rejected as being obvious over Genshiro, Urushibara, and Van Buskirk in further view of U.S. Patent 5,608,414 to Amore. Similarly, Claims 5 and 6 have been rejected as being rejected as being obvious over Benson in view of Urushibara, Van Buskirk, further in view of Amore. These rejections are respectfully traversed.

At the outset, the Examiner should note that he now has combined four different references in two different ways to conclude that the claimed invention is obvious to one of ordinary skill in the art. This is tantamount to going to the parts bin of the patent literature and using impermissible hindsight reconstruction to produce the claimed invention using the applicants own disclosure as a guide.

Furthermore, the Amore reference does not make up for the deficiencies of Genshiro, Benson, Urushibara and Van Buskirk. The Amore patent describes the use of silicon or germanium coatings to protect spacecraft components from solar radiation. There is not suggestion from any patent that the Amore materials, Benson materials, Genshiro materials, Van Buskirk materials and Urushibara materials are readily interchangeable. In fact, the only fact on record is that materials of the claimed invention are rare. At most, Amore shows protecting against solar radiation. It is unconcerned with the passive temperature control of the present invention (i.e., it is focused mainly on "rejecting heat" as is set forth in the title). Hence, any combination of the four references, assuming for arguments sake that such a combination could be made, would not result in the claimed invention since the references of record require a heat control methodology which is opposite to that of the claimed invention.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

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Respectfully submitted,

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